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Global Climate Change

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CONTENTS

SUMMARY

MOST RECENT DEVELOPMENTS

BACKGROUND AND ANALYSIS

Global Climate Change: Science and Policy

- Greenhouse Gases: Sources and Trends

- The Policy Context

- Global Climate Change Funding

International Action

- U.N. Framework Convention on Climate Change (FCCC)

- COP-1, The Berlin Mandate

- COP-2 and a Ministerial Declaration

- “Additional U.S. Proposals”

- COP-3, The UN (Kyoto) Protocol on Climate Change

- COP-4, Buenos Aires

- COP-5, Bonn, Germany

Congressional Interest and Activities

- Brief Summary of 106th Congress, First Session

LEGISLATION

CHRONOLOGY

FOR ADDITIONAL READING

Global Climate Change

SUMMARY

There is concern that human activities are affecting the heat/energy-exchange balance between Earth, the atmosphere, and space, and inducing global climate change. Human activities, particularly burning of fossil fuels, have increased atmospheric carbon dioxide (CO₂) and other trace greenhouse gases. If these gases continue to accumulate in the atmosphere at current rates, many believe global warming would occur through intensification of Earth's natural heat-trapping "greenhouse effect." Possible impacts might be seen as both positive and negative.

A warmer climate would probably have far reaching effects on agriculture and forestry, managed and un-managed ecosystems, including natural habitats, human health, water resources, and sea level depending on climate responses. Regional agricultural practices could change, yield stabilities might decrease in some regions, and survival over winter of some insect pests might increase. Forest productivity might decline in some regions; and changes in climate, when added to other environmental stressors, could produce major regional disturbances. Some climate modification, e.g., in northernmost growing regions, is thought to be beneficial for agriculture however.

Although causal relationships between projected long-range global climate trends and record-setting warmth and severe weather events of the past two decades have not been firmly established, attention has been focused on possible extremes of climate change and the need for better understanding of climate processes to improve climate model forecasts.

The basic policy question is: Given scientific uncertainties about the magnitude,

timing, rate, and regional consequences of potential climatic change, what are the appropriate responses for world decision makers?

Fossil-fuel combustion is the primary source of CO₂ emissions, and also emits other "greenhouse" gases. Removing these gases after combustion is a technical challenge and imposes economic penalties. Policy options to curb emissions, so far, have stressed energy efficiency and conservation, sequestering of atmospheric CO₂, market-oriented strategies such as carbon taxes, emissions trading, switching to less CO₂-intensive fuels, and substituting renewable and nuclear energy. A warmer climate might also result in less energy consumption during winter months.

Congress has reviewed scientific information about climate change to evaluate potential economic and strategic impacts of a warmer, and perhaps more variable, climate to formulate policy responses. Because of the global implications of this problem, concerns are addressed internationally through direct communication between U.S. decision makers and world leaders, participation in international conferences, passage of legislation, and exchange of views and information with international organizations within and outside the United Nations system.

The 1992 U.N. Framework Convention on Climate Change called for a "non-binding" voluntary aim for industrialized countries to control atmospheric concentrations of greenhouse gases by stabilizing their emissions at 1990 levels by the year 2000. The 1997 U.N. Kyoto Protocol on Climate Change goes further and, if it were to enter into force, would commit world governments to legally binding emissions reductions.

MOST RECENT DEVELOPMENTS

*A recently released draft report of the science working group of the third IPCC assessment of global climate change affirmed a human influence on climate. Two additional IPCC working group draft reports are also to be released in the next 2 months for official review of the U.S. government. The finalized versions of the IPCC reports will be used by U.N. advisory bodies that support the climate change negotiations process. Negotiations are expected to resume in November 2000 at the sixth conference of parties to the U.N. Framework Convention on Climate Change (COP-6), which will take place at the Hague, Netherlands. The Agriculture Appropriations Committee bill (H.R. 4461), introduced and reported May 16, 2000, contains language relating to the Kyoto Protocol and climate change funding (see **Legislation**). On May 17, 2000, the Senate Commerce Committee held hearings on the science of global climate change*

BACKGROUND AND ANALYSIS

Global Climate Change: Science and Policy

A large number of scientists believe that human activities, which have increased atmospheric concentrations of carbon dioxide (CO₂) by one-third over the past 100 years, may possibly be leading to an increase in global average temperatures. However, this so-called “global warming” theory is not without challengers who argue that scientific proof is incomplete or contradictory, and that there remain many uncertainties about the nature and direction of Earth’s climate. Nevertheless, concern is growing that human activities, such as the burning of fossil fuels, industrial production, deforestation, and certain land-use practices are increasing atmospheric concentrations of carbon dioxide (CO₂) that, along with increasing concentrations of other trace gases such as chlorofluorocarbons-CFCs, methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulfur hexafluoride (SF₆), may be leading to changes in the chemical composition and physical dynamics of Earth’s atmosphere, including how heat/energy is distributed between the land, ocean, atmosphere and space.

Greenhouse Gases: Sources and Trends

Scientists have found that the four most important variable greenhouse gases, whose atmospheric concentrations can be influenced by human activities, are carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), and chlorofluorocarbons (CFCs). Historically, CO₂ has been the most important, but over the past several decades other gases have assumed increasing significance and, collectively, are projected to contribute about as much to potential global warming over the next 60 years as CO₂. The 1997 U.N. Kyoto Protocol on Climate Change would regulate three other trace gases: hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF₆), whose concentrations in the atmosphere are anticipated to grow over the long-term. Sulfate aerosols, a byproduct of air pollution, are also important for their “climate cooling” effects in the atmosphere.

The amount of carbon cycling from naturally occurring processes each year through the biosphere as CO₂ is enormous — some 800 billion tons. Ice cores and other proxy climate data, which also indicate CO₂ concentrations in the atmosphere, have shown, in general, a relatively stable global climate, at least over the past 10,000 years. Consequently, many scientists suggest that the amount of CO₂ generated by natural processes is about equal to the amounts absorbed and sequestered by natural processes. However, human activity since the Industrial Revolution (c.a. 1850), primarily in the form of burning fossil fuels, is now generating some additional 24 billion tons of CO₂ per year. Available evidence shows that about half this amount is absorbed by natural processes on land and in the ocean and that atmospheric concentrations of CO₂ are now about 32% higher than they were some 150 years ago. Some scientists suggest that a significant amount of CO₂ may be stored in northern latitude soils and in temperate and tropical forests. This may indicate a need to place greater importance on the role of natural resources management and land-use practices, including burning of biomass and deforestation. Other scientists estimate that anthropogenic emissions of CO₂ alone may account for as much as a 60% increase in global mean temperatures of 0.9°F, since 1850. For more information on the science of global climate change, see the CRS Electronic Briefing Book on Global Climate Change web site. [<http://www.congress.gov/brbk/html/ebgcc1.html>].

Latest computer models of the Earth's climate (GCMs) have projected a globally averaged warming of 3 to 8 degrees F over the next 100 years, if greenhouse gases continue to accumulate in the atmosphere at the current rate. Prominent climate scientists have predicted that such a warming could shift temperature zones, rainfall patterns, and agricultural belts and, under certain scenarios, cause sea level to rise and inundate low-lying coastal areas. They further predict that global warming could have far-reaching effects — some positive, some negative depending how it may be experienced in a given region — on natural resources; ecosystems; food and fiber production; energy supply, use, and distribution; transportation; land use; water supply and control; and human health.

So-called “skeptics” of the global warming theory have called into question the reliability of the computer climate models and their output used to make projections of future warming that supported Kyoto Protocol negotiations. They have also challenged some scientists' assertions that, although recent episodic weather events may seem more extreme in nature, this is indicative of long-term climate change. The Clinton Administration has received criticism about attributing recent weather anomalies to a warming of the climate. And so the scientific questions remains: Can scientists now confirm that humans are indeed, at least in part, the cause of recent climate changes and, if so, as a result of this, is the Earth committed to some degree of future global warming, then what might the consequences of that be, and what might be prevented?

In their 1995 assessment of global climate change, the UN Intergovernmental Panel on Climate Change (IPCC) reported a “discernable human impact on the climate system,” even though that signal might not appear to have emerged clearly from the background noise of natural climate variability. Scientific uncertainties contrary to this opinion were addressed in Chapter 8, “Detection of Climate Changes and Attribution of Causes,” in the Science Working Group Report. More recently, an IPCC *Special Report on Emissions Scenarios* recalculated future levels of sulfur dioxide (SO₂) emissions growth, and projected these would be less than those reported in the 1995 IPCC Assessment. Also, In a July 1999 report by the Pew Center, Tom Wigley of the National Center for Atmospheric Research (NCAR)

went a step further to suggest that the offsetting (or cooling) effects on the global climate from sulfate aerosols would be far less by the end of the next century and, therefore, he revised IPCC estimates of global mean warming from 1990 to 2100 upward from 1.9°C to 2.9° (3.5° F to 5.2°F), and sea-level to rise upward from 48cm to 58cm (19" to 23"), over the same period.

Evidence of natural variability of climate is large enough that even the record-setting warmth and severe weather events in the 1980s and 1990s does not allow a vast majority of knowledgeable scientists to state beyond a reasonable doubt that weather extremes experienced over the past two decades are attributable to "global warming," at least at the present time. In some cases, causal relationships between seasonal climate changes and present-day severe weather events are now beginning to be recognized, because of an improved ability to observe the *El Nino* and *La Nina* phenomena. This notwithstanding, singular extreme weather events have focused public attention on possible outcomes of potential long-term climate change and a need for a better understanding of regional climates. Scientists have also debated whether recent emergence of tropical diseases in the mid-latitudes may signal Earth's climate is warming on average.

National Oceanic and Atmospheric Administration's (NOAA) researchers have reported that the 12 warmest years, globally averaged, since historical records have been kept occurred in the past two decades, with 1990 and 1998 shaping up to be among the warmest. At least some of this warming, they concluded, is human-induced. On the other hand, satellite instruments — which measure temperatures of the atmosphere in a deep column above the surface — over the past 20 years are hard pressed to demonstrate any positive trends.

A recent report by the U.S. National Research Council, Board on Atmospheric Sciences and Climate, Panel on *Reconciling Observations of Global Temperature Change* (January 13, 2000), looked at whether the observed surface warming of the Earth (at least over the past 20 years) is real or an artifact of unreliable and inconsistent data. Also, the report attempts to resolve disparities between temperature trends measured at the surface and upper air temperature trends, from satellite data, which skeptics have claimed may invalidate the results of general circulation models (GCMs) that have forecasted future climate change. GCMs have demonstrated a homogenous warming throughout all the levels of the Earth's atmosphere. Panel scientists believe that there may be a systematic disconnect between the upper and near surface atmosphere and have cited physical processes which may have a unique impact on the upper atmosphere that are not currently accounted for in GCMs. In any event, the Panel concluded that much uncertainty remains and that consistent long-term monitoring of the upper atmosphere would be necessary to explain the difference in temperature trend.

The "National Assessment of the Consequences of Climate Variability and Change" was prepared by a sub-group of the U.S. Climate Change Research Program (USGCRP), and various regional and resource-focused reports are available at the USGCRP website [<http://www.nacc.usgcrp.gov>]. A synthesis report for Congress that will consist of an overview of all of the regional studies is still anticipated.

A recent draft report by the IPCC working group on the science of global climate change has concluded that "there has been a discernible human influence on the climate." However, they cautioned that little else new is revealed in terms of projecting future climate change,

from resolving uncertainties about the models, to the behavior of clouds, to the vagaries of the effects of human's burning of fossil fuels. Notably, skeptics are not denying a human role in climate change, but lately have been emphasizing scientific findings about the modest size and an inferred minimal future impact of climate change. The third IPCC assessment is expected to advise continuing negotiation on climate change, including implementation of the Kyoto Protocol, when COP-6 convenes in November in the Hague, Netherlands.

The Policy Context

The prospect of global warming from an increase in greenhouse gases has become a major science policy issue during the past 15 years. Seeking answers to a number of questions — How much warming?...How soon?...Should we worry? — a growing number of policymakers continue to debate the advantages and disadvantages of an active governmental role in forging policies to address prospective climate change. How real is the human-induced global warming threat? Another 10-15 years of continued warming might validate the scientific projections, but many scientists caution that waiting for this added assurance might put society at risk for a larger dose of climate change than if actions to curb or slow the buildup of greenhouse gases were implemented now. But actions on what scale?

Policymakers, here and abroad, are counseling cautious courses of action to address the prospect of climate change that many believe is still theoretical and cannot be foreseen with confidence. Given uncertainties about the timing, pace, and magnitude of global warming projections and the imprecise nature of the regional distribution of possible climate changes, and recognizing the complex feedback mechanisms within the climate system that could mask, mimic, moderate, amplify, or even reverse a greenhouse-gas-induced warming, the question is posed: What policy responses, if any, are indicated, now, or in the future?

Many proponents for early actions to address potential climate change have suggested adopting a "precautionary principle" comprised of a number of anticipatory, yet flexible policy responses that might be likened to the purchase of an insurance policy to hedge against some risks of potential climate change in the future. Broader national responses might range from engineering countermeasures, to passive adaptation, to prevention, and pursuit of an international law of the atmosphere. One policy widely advocated by President Bush in the early 1990s, and to some degree implemented, is the so-called "no regrets" approach, which in theory not only reduces emissions of greenhouse gases but provides other benefits to society as well. Such policy options stress energy efficiency and conservation, renewable energy, planting trees to enhance CO₂ sequestration from the atmosphere, and substitution of lesser or non-CO₂ producing fuels. Many scientists suggest that such actions might buy time to gain a better understanding of global climate change and perhaps reduce possible negative impacts attributable to human-induced climate change, should they occur.

On October 19, 1993, President Clinton released his *Climate Change Action Plan* (CCAP), which proposed voluntary domestic measures to attain greenhouse gas emissions stabilization as outlined under the terms of the U.N. FCCC (see **International Action**), and reflected in the President's own goals to stabilize U.S. emissions at 1990 levels by the year 2000. The CCAP called for a comprehensive suite actions by industry, utilities and other large-scale energy users. It promoted energy-efficiency upgrades through new building codes in residential and commercial sectors, and other energy-efficiency improvements in energy-generating or -using technologies. Large-scale tree planting and forest reserves were

encouraged to enhance sequestration of carbon dioxide and to conserve energy. Other aspects of the plan addressed mitigation of greenhouse gases other than CO₂. By avoiding mandatory command and control measures, CCAP, in one sense, appeared to be moving aggressively to implement “no-regrets” policies. Periodically, the Administration has hinted at stronger regulatory actions; and some economists have suggested implementing some form of carbon (or other energy use) tax to deter fossil fuel consumption. National energy taxes, however, historically have proven controversial with U.S. energy producers and consumers alike.

In deliberations over U.S. policy on global climate change, some trade groups and labor unions representing America’s heavy industry, utility, and agricultural sectors have been some of the strongest vocal opponents of regulation of CO₂ emissions, claiming their members would bear the greatest economic burden of regulating greenhouse gas emissions from fossil fuels. These organizations project the loss of many American jobs to countries which would not be required to impose as strong environmental regulations, and they have routinely expressed opposition against any effort by the President to commit to greenhouse gas reductions that are not supported by sound scientific and economic analysis. Lately, these interest groups, and prominent Members of Congress, have challenged greenhouse gas control proposals under the 1997 U.N. Kyoto Protocol that would *not* apply to developing countries in kind, and, consequently, many of them have opposed U.S. ratification of the Protocol. Not all business/industry-related organizations, the Pew Center for example, are of the same opinion, however. Some industries have foreseen opportunities in developing and marketing globally environmental “friendly” technologies, by switching to less CO₂-intensive fossil fuels, expanding renewable and alternative energy resources for power generation, and expanding use of nuclear power.

Traditional Clinton Administration climate change policy has encouraged *flexibility* in achieving U.S. greenhouse gas emissions goals, taking into account *where* global emissions occur and *when* such reductions would be the most economically feasible. This policy considers the life cycle and potential market of new capital equipment, e.g., energy generating technologies, that might portend savings in energy costs while enabling concomitant emissions reductions. In concert with the *when* and *where* policy, is *joint implementation* that would allow industrialized countries to share credits for emissions reduction with developing host countries. The latest dimension of the “flexible” policy response is the *what* factor, which U.S. representatives characterize as, choosing what off-the-shelf mitigation technologies and adaptation strategies may make the most sense to develop and utilize now *where and when feasible*. While some economists have suggested that stronger climate protection measures may actually benefit the U.S. economy, others have projected dire economic consequences, including major loss of GDP depending upon what *assumptions* underlay their respective economic models.

On November 12, 1998, President Clinton instructed a representative to sign the Kyoto Protocol to “lock-in” U.S. interests achieved during negotiations. This act drew protest by some in Congress because the Kyoto Protocol had not yet been debated by the U.S. Senate and many claimed that it was in violation of S.Res. 98, the Byrd/Hagel Resolution, requiring an economic analysis and legally binding emission reductions of all FCCC parties. The President announced he would continue to pursue efforts to attain “meaningful” commitments from key developing countries, perhaps unilaterally, over the next couple of years, before he would consider sending the treaty to the U.S. Capitol Hill in deference to S.Res. 98.

The Clinton Administration released an economic analysis (July 1998), prepared by the Council of Economic Advisors, that concluded that with emissions trading among the Annex B-countries, and participation of key developing countries in the “Clean Development Mechanism” — which grants the latter business-as-usual emissions rates through 2012 — the costs of implementing the Kyoto Protocol could be reduced as much as 60%. Other economic analyses, however, prepared by the Congressional Budget Office and the DOE Energy Information Administration (EIA), and others demonstrated a potentially large loss of GDP by implementing the Protocol. Some (the EU most notably) have questioned assumptions about whether such emission credits will be available for trade, especially in light of East and Central Europe’s and some countries of former Soviet Union’s desire to resume rapid economic development. At the Ministerial session at COP-5, this notion is reflected in the urging of some FCCC parties to ensure the bulk of emissions reductions take place on the domestic front.

On June 3, 1999, President Clinton with Executive Order (E.O.) No. 13123, called for a “Greening the Government Through Efficient Energy Use.” In §201 of that E.O., a “Greenhouse Gases Reduction Goal” is envisioned which calls for improvements in facility energy use and specifies a reduction of 30% from 1990 levels by 2010. The Department of Energy has announced that efforts under the E.O., along with other voluntary climate change initiatives to date, have helped the United States to reduce its emissions by as much as 19% below 1990 levels, and ahead of the proposed timetable suggested by the Kyoto Protocol.

Global Climate Change Funding

On February 14, 2000, the Clinton Administration released details of its proposed climate change spending for FY2001. A spokesperson for the Climate Change Task Force reported on highlights of the Administration’s plan to spend some \$4.1 billion in FY2001 for climate change-related domestic programs, investments, and tax incentives. This funding includes \$1.7 billion for the U.S. Global Change Research Program (USGCRP), with a focus this year on 1) Improved Climate Observations, 2) the Global Water Cycle, 3) Ecosystem Changes (climate change impacts), and 4) Understanding the Carbon Cycle. USGCRP funding would be divided among nine federal agencies, details of which will be included in “Our Changing Planet: FY2001,” a budget document prepared by USGCRP.

Also, the President has slated \$2.4 billion for “Climate Change Solutions” (CCS), which includes technology investment spending and tax breaks (\$4 billion in total tax incentives would be realized between FY01-FY05) associated with the President’s Climate Change Technology Initiative (CCTI). Included under CCS are a Biofuels & Bioproducts Initiative, Energy Conservation programs, and International Clean Energy Initiative (ICEI) for international investments in “enviro-friendly” technologies. Grants would be provided by the Agency for International Development (AID). (See CRS Report RL30452.)

International Action

The United States was involved in climate change negotiations and research activities prior to ratifying the 1992 U.N. Framework Convention on Climate Change (FCCC). This includes passage of a National Climate Program Act of 1978 (P.L. 95-367). These activities

are discussed in CRS Report 98-431, *Global Climate Change: A Concise History of Negotiations and Chronology of Major Activities Preceding the 1992 U.N. Framework Convention*. Early aspects of debate on the science of climate change are also addressed.

U.N. Framework Convention on Climate Change (FCCC)

The U.N. Framework Convention on Climate Change (FCCC) was opened for signature at the 1992 UNCED conference in Rio de Janeiro (“The Earth Summit”). On June 12, 1992, the United States, along with 153 other nations, signed the FCCC, that contained a legal framework that upon ratification committed signatories’ governments to a voluntary “non-binding aim” to reduce atmospheric concentrations of greenhouse gases with the goal of “preventing dangerous anthropogenic interference with Earth’s climate system.” These actions were aimed primarily at industrialized countries, with the intention of stabilizing their emissions of greenhouse gases at 1990 levels by the year 2000. On September 8, 1992, President Bush transmitted the FCCC for advice and consent of the U.S. Senate to ratification. The Foreign Relations Committee endorsed the treaty and reported it (Senate Exec. Rept. 102-55) October 1, 1992. The Senate consented to ratification on October 7, 1992, with a two-thirds majority division vote. President Bush signed the instrument of ratification October 13, 1992, and deposited it October 15, 1992, with the U.N. Secretary General. According to terms of the FCCC, having received over 50 countries’ instruments of ratification, the FCCC entered into force March 24, 1994.

COP-1, The Berlin Mandate

Seeking grounds for a uniform approach toward climate protection, the Conference of Parties (COP) to FCCC met for the first time in Berlin, Germany in the spring of 1995, and voiced concerns about the adequacy of countries’ abilities to meet commitments under the Convention. These were expressed in a U.N. ministerial declaration known as the “Berlin Mandate,” which established a 2-year Analytical and Assessment Phase (AAP), to negotiate a “comprehensive menu of actions” for countries to pick from and choose future options to address climate change which for them, individually, made the best economic and environmental sense. FCCC parties also deliberated over elements of possible amendments to FCCC and/or a subsequent protocol that might advance climate protection. They also discussed whether numerical aims, such as targets and timetables, binding or non-binding agreements, or technology-related goals, alone, might be “adequate” for climate protection. Another major issue dealt with was what some called “an arbitrary division between Annex I and Developing countries,” that concerned the effectiveness of commitments of each class in achieving the goals of FCCC. Criticism was leveled by many industrialized countries, including the United States, against many newly industrializing countries, such as Brazil, India, and China, because these would continue to be classified as non-Annex I countries and enjoy certain exemptions under the Berlin Mandate — including exemption from future, legally binding emissions reduction agreements — even though these countries collectively could become the worlds largest emitters of greenhouse gas emissions 15 years hence. (For more information see, CRS Report 96-699, *Global Climate Change: Adequacy of Commitments Under the U.N. Framework Convention and the Berlin Mandate*.)

COP-2 and a Ministerial Declaration

The Second Conference of Parties to the FCCC (COP-2) met in July 1996 in Geneva, Switzerland, and its Ministerial Declaration was adopted July 18, 1996. This document reflected a U.S. position statement presented by Timothy Wirth, former Under Secretary for Global Affairs for the U.S. State Department at the Ministerial Meeting that, 1) accepted outright the scientific findings on climate change proffered by the Intergovernmental Panel on Climate Change (IPCC) in its second assessment (1995); 2) rejected uniform “harmonized policies” in favor of flexibility; and 3) called for “legally binding mid-term targets.” Legally, the Declaration represented the consensus of ministerial participants at COP-2 that, as a body, they did not object to a “future decision which would be binding on all parties under the FCCC,” with individual reservations included and noted.

“Additional U.S. Proposals”

On June 26, 1997, the State Department submitted “Additional U.S. Proposals” to the COP, that would 1) condone penalties for parties which exceed an allowed emissions budget for a given 5-year period; 2) clarify eligibility of parties to participate in emissions trading schemes and their obligations pertaining to measurements and reporting of emissions, including devising national mechanisms for certification and verification of trades; and 3) preclude from trading any party which exceeds its emissions budget or is in question of compliance. These proposals concerning treaty compliance were not adopted in the final working text of the Protocol (“the Kyoto Accord”).

COP-3, The UN (Kyoto) Protocol on Climate Change

Prior to Kyoto Protocol ministerial negotiations in December 1997, it had been the goal of President Clinton to return U.S. greenhouse gas emissions to 1990 levels by the year 2012 (a 30% reduction). The vehicle to achieve these reductions was a 3-tracked proposal which included \$5 billion in tax breaks (over 5-years) to U.S. industries to develop technologies and practices which reduce greenhouse gas emissions, a restructuring of the electric utilities industry, and the development of some form of emissions trading between FCCC parties for credits. Thus far the Administration has succeeded in implementing only the first track of this proposal, with its request for funding of the Climate Change Technology Initiative (CCTI) in his FY1999 budget.

The 1997 U.N. Kyoto Protocol on Climate Change was adopted in Kyoto, Japan one day after the official session ended. Most industrialized nations and some central European countries (defined as Annex B countries) agreed to legally binding reductions in greenhouse gas emissions of an average of 6%-8% below 1990 levels between the years 2008-2012, identified as the first emissions budget period. However, some Annex-B countries would be allowed to increase their greenhouse gas emissions. Globally, emissions of three major greenhouse gases (CO₂, CH₄, N₂O) would be projected to decline about 5% below 1990 levels over the next 10 years. Three other greenhouse gases (PFCs, HFCs and SF₆) would count toward reductions, based on parties’ choice of either their 1990 or 1995 levels of production, and land sources and sinks would be considered for possible future credits. The United States would be required to reduce its total emissions an average of 7% below 1990

levels by the year 2012. (For more details, see CRS Report 98-2. *Global Climate Change Treaty: Summary of the Kyoto Protocol.*)

COP-4, Buenos Aires

COP-4 took place in Buenos Aires in November 1998, at which FCCC parties adopted a 2-year "Plan of Action" to advance efforts and devise mechanisms for implementing the Kyoto Protocol. They also addressed compliance and response mechanisms to encourage more developing countries to sign on to the protocol. However, talks on compliance mechanisms stressed a front end "qualifying" approach rather than "sanctions and punitive measures" as the EU, and the U.S. had originally, supported. (That is, parties must be in compliance to take part in emissions trading and joint implementation, by at least being accepted for Annex-B status, while few restrictions would apply for developing countries wishing to participate in the "clean development mechanism.") Work continued at COP-4 to determine how to calculate possible emissions reductions that might result from strengthening "carbon sinks," and devising technical definitions for current forest, vegetation, and land-use practices.

COP-5, Bonn, Germany

The 5th Conference of Parties to the U.N. Framework Convention on Climate Change met in Bonn, Germany. COP-5 met between October 25 and November 2, and included work of the Subsidiary Bodies on Implementation and Science and Technology. Jan Szyszco, of Poland, chaired the plenary sessions. COP-5 ended on November 4, following a two-day ministerial session. Major themes of the conference included devising the technical and political mechanisms, such as the Clean Development Mechanism (CDM), Joint Implementation (JI), and developing criteria for project eligibility, all processes that would allow developed and developing nations to meet their respective responsibilities under the 1997 Kyoto Protocol with optimum flexibility. Also under consideration were legally-binding consequences for non-compliance of parties under FCCC, an action that, in and of itself, would require an amendment to the Kyoto Protocol, and the development of a COP-certified national inventorying systems for greenhouse gas emissions and their reduction. A decision for a second round of national communications (for Annex I countries) was adopted at COP-5; and interested parties, including the Association of Small Island States (AOSIS), have encouraged the COP to use this new data and information to inform ongoing negotiations.

The U.N. FCCC COP-6 is scheduled to take place in the Hague, Netherlands, November 13-24, 2000. The Kyoto Protocol stipulates that negotiations must begin by the year 2005 to address what actions may be necessary to pursue after the first emission budget period which would end in the year 2012. However, that treaty has yet to be ratified by the United States and is still a long way from meeting the criteria established by the COP necessary for its entry into force.

Congressional Interest and Activities

For a review of legislative activities in the 100th - 102nd Congresses, see CRS Report 93-445 SPR: *Global Climate Change Legislation: A Review of the 102nd Congress.*

Recent legislation and other related information on global climate change may also be found in the CRS Electronic Briefing Book, *Global Climate Change at* [<http://www.congress.gov/brbk/html/ebgcc1.html>].

Brief Summary of 106th Congress, First Session

No fewer than 17 bills were introduced on global climate change in the first session of the 106th Congress (See **Legislation**). Many of these dealt with congressional concern about “back door” implementation of the 1997 Kyoto Protocol to the 1992 U.N. Framework Convention on Climate Change (FCCC) prior to its possible advice and consent to ratification by the Senate. Related directives were also found in some FY2000 appropriation bills including P.L. 106-74, Department of Veterans Affairs and Housing and Urban Development, and Independent Agencies Appropriations Bill, 2000, reported August 3, 1999 (H.Rept. 106-286); and P.L. 106-113, Department of Interior and Related Agencies Appropriations 2000, in conference report on H.R. 2466 (H.Rept. 106-406), and later incorporated in FY2000 Consolidated Appropriations, and passed by cross reference (H.Rept. 106-479). The Agricultural Appropriations bill for FY2001 (H.R. 4461, see below) was introduced May 16, 2000. The bill and its report (H.Rept. 106-619) also contain language about funding for Kyoto Protocol activities, and would place a deadline on Administration referral of this treaty for advice and consent to the Senate for ratification of December 11, 2000.

Other bills sought mechanisms for how to act legislatively on climate change, in lieu of the Kyoto Protocol, and stressed voluntary measures. Most legislative activity was confined to relevant committees of jurisdiction and was in the nature of oversight hearings. Some of the global climate change legislation introduced in the first session may have an excellent chance of being acted upon in the second. This may come after further hearings on the merits or short comings of these original measures, and how they might be modified to acquire a broader consensus for possible enactment. Also, Congress will likely continue to exercise its oversight authority to ensure that aspects of U.S. research on climate change are complying with the 1994 Government Performance and Results Act (GPRA) and that such research continues to inform the policy process. The Senate still awaits the transmittal of the Kyoto Protocol from President Clinton in order to provide its advice and consent to ratification. Also, funding increases have been requested for FY2001 for a number of presidential climate change initiatives. (See **Global Climate Change Funding**).

New scientific findings concerning the human contribution to climate change are likely to be released during expert review of the third IPCC assessment on climate change; review drafts of the three working groups are to be released in the next two months, and these may engender an interest in Congress to hold hearings. However, overall projections of temperature and sea-level rise made in the IPCC’s 1995 Assessment are unlikely to change. Some discussion has also ensued about whether to consider other potential greenhouse gases not slated to be regulated by the Kyoto Protocol, and also to consider the effects of potential secondary climatic change effects that may be attributable to other atmospheric emissions (e.g., replacements for ozone depleting substances). On January 13, 2000 the National Research Council released a report on reconciling surface and atmospheric temperature trends and their implications for global climate change models.

LEGISLATION

H.R. 2221 (McIntosh)

Prohibits the use of federal funds to implement the Kyoto Protocol until the Senate gives its advice and consent to ratification, and clarifies the authority of federal agencies with respect to regulating the emissions of carbon dioxide. The bill would extend and strengthen language in FY1999 appropriations for VA, HUD and Independent Agencies (P.L. 105-276), regarding implementation of the Kyoto Protocol, "early action crediting," EPA's authority to regulate greenhouse gases, and concerns of small businesses and family farms under a future climate change treaty or domestic program regulating greenhouse gas emissions. It would restrict use of federal funds to advocate, develop, or implement a program to provide regulatory credits for early voluntary greenhouse gas reductions prior to the Senate's advice and consent to ratification of the Kyoto Protocol. Introduced June 15, 1999; referred to House Committee on Commerce. Referred to Subcommittee on Health and Environment on June 24, 1999.

H.R. 2520 (Lazio/Dooley)

The Credit for Voluntary Actions Act. Authorizes the President to enter into agreements to provide regulatory credit for voluntary early action to mitigate potential environmental impacts from greenhouse gas emissions. Introduced July 14, 1999, referred to the House Committee on Commerce. Subcommittee on Energy and Power hearings held on July 30, 1999.

H.R. 2819 (Udall)/H.R. 2827 (Ewing)

Biomass Research and Development Act of 1999, was introduced September 8, 1999; and similar bill, The National Sustainable Fuels and Chemicals Act of 1999, was introduced September 9, 1999. The latter bill would amend the National Agricultural Research, Extension and Teaching Policy Act of 1977 to authorize research to promote the conversion of biomass into bio-based industrial products, and for other purposes. Both bills were referred to House Committees on Agriculture and Science. Language in both bills "Recognize benefits to the national interest of near net zero greenhouse gas emissions of bio-based fuels and chemicals... improved soil fertility and carbon sequestration." H.R. 2827 creates an joint USDA/DOE Sustainable Fuels and Chemicals Board to coordinate interagency research and development activities. Authorizes appropriations of \$49 million for each of fiscal years 2000-2005, and authorizes a total of \$14 million for an Ethanol Research Pilot Plant. Hearings held on both bills by House Subcommittee on Energy and Environment October 28, 1999.

H.R. 3384 (Barton)

Strengthens the provisions of the 1992 Energy Policy Act with respect to potential climate change. Establishes a Director of Climate Protection in the Office of Global Climate Change in the Department of Energy. Amends §1605 of the Energy Policy Act of 1992 (42 USC 13385), regarding voluntary greenhouse gas emissions reductions and offsets. Introduced November 16, 1999; referred to Committee on Commerce. Referred to Subcommittee on Energy and Power December 3, 1999.

H.R. 4461 (Skeen)

Agriculture, Rural Development, Food and Drug Administration, and Related Agencies Appropriations Bill, 2001. Introduced May 16, 2000; reported May 16, 2000

(H.Rept. 106-619). In *Committee Provisions*, of the report, "The Committee does not include funds for global climate change, biomass products initiative... as requested in the budget." Under Title V – General Provisions, § 734 relates to the Kyoto Protocol to the U.N. Framework Convention on Climate Change (UNFCCC). The Committee directed that the Kyoto Protocol be sent to the Senate for advice and consent to ratification within 3 years of its adoption (December 11, 1997). The Committee clarified that no funds shall be spent for items solely in the Kyoto Protocol, including carbon emissions trading schemes and the Clean Development Mechanism, and cited current U.S. expenditures for such; however, it encouraged exports to improve the environment of foreign nations and other legislative enactments, referring to provisions of the UNFCCC. In *Additional Views of Hon. David R. Obey and Hon. Marcy Kaptur*, included in H.Rept. 106-619, there is a section entitled "Language Regarding the Kyoto Protocol," in which opponents of the amendment to H.R. 4461 claim that the language would seek to restrict the funds for mechanisms related to addressing the threat of global climate change. Some Members have also interpreted this clause to mean a barring, in effect, of U.S. participation in Kyoto Protocol negotiations or any other bilateral initiatives relating to these provisions, which seems contradictory to the Byrd-Hagel resolution (S.Res.98), which called for developing country participation in global climate change protection. The minority statement noted, "The new language seems to prohibit any spending to discuss, research, or work on developing approaches... that could be used to implement any system for reduction of greenhouse gases and global warming that might be agreed upon in the future." Furthermore, the minority statement raised the prospect that "Including this new restrictive language in the agricultural appropriations bill seems especially unfortunate, since there appears to be an important and positive role that could be played by farmers and farmland in addressing global warming problems."

S. 547 (Chafee)

Amends the Clean Air Act and proposes early emissions credits for U.S. industries that undertake voluntary actions to reduce greenhouse gas emissions between the years 1999 and 2010. Requires amending Section 1605 of the 1992 Energy Policy Act (EPACT) to ensure the accurate accounting of domestic greenhouse gas emissions reductions. Emissions credits would not be allowed for activities commenced before 1999, and would not be granted until 2008 to coincide with the beginning of the first emissions budget period under the Kyoto Protocol. Some environmental and business groups have seen the need for a clarification of its provisions, such as whether credits should be granted for domestic carbon sequestration activities which are difficult to quantify. Others have criticized the measure because it presupposes eventual U.S. ratification of the Kyoto Protocol. Introduced March 4, 1999; referred to Committee on Environment Public Works. Hearings were held by that Committee on March 24, and June 3, 1999; hearings printed (S.Hrg. 106-150).

S. 882 (Murkowski)

Strengthens provisions in the Energy Policy Act of 1992 and the Federal Nonnuclear Energy Research and Development Act of 1974 with respect to potential Climate Change. Establishes the Office of Global Climate Change in Department of Energy for coordination of climate change activities at agency which reports to Secretary of Energy. Authorizes \$2 billion for a ten-year research, development and demonstration program to develop new technology through public-private partnerships to help stabilize greenhouse gas concentrations in the atmosphere. Promotes voluntary efforts to reduce greenhouse gas emissions and reporting under Sect. 1605 of the Energy Policy Act of 1992. Reiterates

continued opposition to Kyoto Protocol because of its potential costs and little, if any environmental gain. Introduced April 27, 1999; referred to Committee on Energy and Natural Resources. Hearings held March 30, 2000.

S. 935 (Lugar)

National Sustainable Fuels and Chemicals Act of 1999. Amends the National Agricultural Research, Extension, and Teaching Policy Act of 1997 to authorize research to promote conversion of biomass into bio-based industrial products, and for other purposes. Cites zero net greenhouse gas emissions from biomass fuels. Authorizes \$49 million per year for each of fiscal years 2000 through 2005 for a sustainable fuels and chemicals research initiative, including research on bio-based products that can compete in performance with fossil-based products, and on accurate measurement and analysis of carbon sequestration and carbon-cycling in relation to bio-based industrial products and feedstocks. Introduced April 30, 1999; referred to Committee on Agriculture, Nutrition, and Forestry. Hearings held May 27, 1999. Ordered to be reported with amendments in the nature of a substitute on July 29, 1999; Senate Agriculture Committee reported measure (S.Rept. 106-179) on October 8, 1999. S. 935 passed the Senate (amended) on February 29, 2000, with an amendment to the Title, and was referred to the House Agriculture and Science Committees on March 9, 2000. Referred to House Subcommittee on Energy and Environment on March 23, 2000.

S. 1066 (Roberts)

Introduced May 18, 1999, referred to Senate Committee on Agriculture, Nutrition and Forestry. Amends the National Agricultural Research, Extension, and Teaching Policy Act of 1977. Encourages the use of and research into agricultural best practices to improve the environment, and for other purposes. Findings of bill cite magnitude and importance of carbon storage in soils. Authorizes appropriations. Suggests enhancement of carbon storing strategies through agricultural best practices in lieu of implementing the Kyoto Protocol. Requires the Economic Research Service to report on the impact on the farm economy of the United States under the Kyoto Protocol and Framework Convention on Climate Change.

S. 1457 (Wyden)

Forest Resources for the Environment and the Economy Act. To amend the *Energy Policy Act of 1992* to assess opportunities to increase carbon storage on national forests derived from the public domain and to facilitate voluntary and accurate reporting of forest projects that reduce atmospheric carbon dioxide concentrations, et alia. Introduced July 29, 1999. Referred to Senate Committee on Energy and Natural Resources. Hearings held by Subcommittee on Forests and Public Lands on September 30, 1999.

S. 1776/S. 1777 (Craig)

Climate Change Energy Policy Response Act. Amends the Energy policy Act of 1992 to revise the energy policies of the United States in order to reduce greenhouse gas emissions (voluntarily), advance global climate science, promote technology development, and increase citizen awareness, and for other purposes (e.g., creates mechanisms and institutions necessary for implementing provisions of Bill. Section 1604 extends authority to DOE to become the lead agency on climate change research and public information programs in support of these provisions. Section 1612 establishes a Natural Resource Center on Climate Change (NRCCC). Makes any certifications for emissions reductions prior to enactment subject to review by Secretary of Energy. Authorizes funding for energy technology RD&D. S.1777 (Craig) is tax legislation which would enable implementation of S. 1776. Both introduced

October 25, 1999; S. 1776 was referred to Senate Committee on Energy and Natural Resources; hearings held March 30, 2000. S. 1777 was referred to Senate Finance Committee on October 25, 1999.

S. 1949 (Leahy)/H.R. 2980 (Allen)

Clean Power Plant and Modernization Act of 1999. Section 11 of S. 1949 recognizes potential of permanent emissions reductions in future climate change implementation programs, through retirement of old electricity generating units and replacement by new generating units that meet the combustion heat rate efficiency and emission standards specified by this Act. Governs any climate change implementation program enacted by Congress and directs that reduction credits be given to electricity consumers. Introduced November 17, 1999; referred to Committee on Finance. H.R. 2980, introduced September 30, 1999, would reduce emissions of mercury, carbon dioxide, nitrogen oxides, and sulfur dioxide from fossil fuel-fired electric utility generating units operating in the United States; referred to House Committees on Commerce, Education and Workforce, Transportation and Infrastructure, Banking and Financial Services, and Science.

CHRONOLOGY

04-05/00 – Draft third IPCC assessment of climate change released for expert review.

02/13/00 – President Clinton announced details of climate change expenditures for FY2001.

10/25/99 - 11/04/99 — COP-5 convened in Bonn, Germany.

06/03/99 — President Clinton issues executive order on federal energy use/greenhouse gases.

11/12/98 — President Clinton instructed a U.S. representative to sign the Kyoto Protocol.

11/2-13/98 — COP-4 met in Buenos Aires; a 2-year “Plan of Action” was adopted.

03/16/98 — Kyoto Protocol opened for signature.

12/01-11/97 — U.N. Kyoto Protocol on Climate Change adopted at conclusion of COP-3.

06/12/97— S.Res. 98 introduced (the Byrd/Hagel Resolution).

07/08-19/96 — Ministerial Declaration issued in Geneva, Switzerland at COP-2 (07/18/96).

03/28-04/06/95 — First Conference of Parties (COP-1) met, adopted “Berlin Mandate.”

03/24/94 — U.N. Framework Convention on Climate Change entered into force.

FOR ADDITIONAL READING

U.N. Environmental Program. Intergovernmental Panel on Climate Change. *IPCC Second Assessment Synthesis of Scientific-Technical Information Relevant to Interpreting Article 2 of the U.N. Framework Convention on Climate Change, 1995 and Summaries for Policymakers of Working Groups I, II, and III of the IPCC 1995*. IPCC Secretariat (WMO), Geneva, Switzerland: December 1995.

U.S. Department of State. Bureau of Oceans and International Environmental and Scientific Affairs. Office of Global Change. *Climate Action Report: 1997 Submission of the United States of America Under the U.N. Framework Convention on Climate Change*. (DOS Pub. 10496), Washington, DC: 1996.

U.S. Executive Office of the President. *Climate Change Action Plan*, by President William J. Clinton and Vice President Albert T. Gore, Jr. Washington, DC: October 1993.

U.S. Office of Science and Technology Policy. Committee on Environment and Natural Resources Research. *Our changing planet: the FY2000 U.S. Global Change Research Program; Implementation and Budget Overview*. Washington, DC: May 1999.

U.S. National Research Council. Commission on Geosciences, Environment, and Resources. Board on Atmospheric Sciences and Climate. Climate Research Committee. *Reconciling Observations of Global Temperature Change*, by the Panel. Washington DC: January 2000.

CRS Reports

CRS Report 98-2. *Global Climate Change Treaty: Summary of the Kyoto Protocol*, by Susan R. Fletcher.

CRS Report 98-235. *Global Climate Change: Reducing Greenhouse Gases — How Much from What Baseline?*, by Larry Parker and John Blodgett.

CRS Report 98-664. *Global Climate Change: Congressional Concern about “Back door” Implementation of the 1997 U.N. Kyoto Protocol*, by Wayne Morrissey.

CRS Report RL30155. *Global Climate Change Policy: Domestic Early Action Credits*, by Larry Parker and John Blodgett.

CRS Report RL30209. *Global Climate Change Policy: From “No Regrets” to S. Res. 98*, by Larry Parker and John Blodgett.

CRS Report RL30452. *Climate Change Technology Initiative (CCTI): R&D and Related Programs*, by Michael Simpson.